# ANTUSB-m Stick

FEATURES

- 78 selectable RF channels in 2403 to 2480MHz ISM band
- ANT channel combined message rate up to 190Hz (8byte data payload)
- Minimum message rate per ANT channel 0.5Hz
- Advanced burst transfer rate up to 60Kbps (true data throughput)*
- Up to 8 ANT channels
- Up to 8 public, managed and/or private network keys*
- Single channel encryption*
- High duty search and active search sharing*
- User writable space of 500 bytes
- WHQL certified Windows driver
- No driver installation is required on Mac OS X machines
- Support on device using Android 3.1 or later and having USB host enabled
- ANT library files for applications development
- Supports USB 1.1/2.0 Full Speed specification with Type A USB connector
- Radio regulatory approval for major markets
- -10°C to +50°C operating temperature
- 19.0 x 12.5 x 5.0 mm
- RoHS compliant

* Enhancements in the new generation ANT core stack

Artwork not exactly as shown

ANT NETWORK CONFIGURATIONS
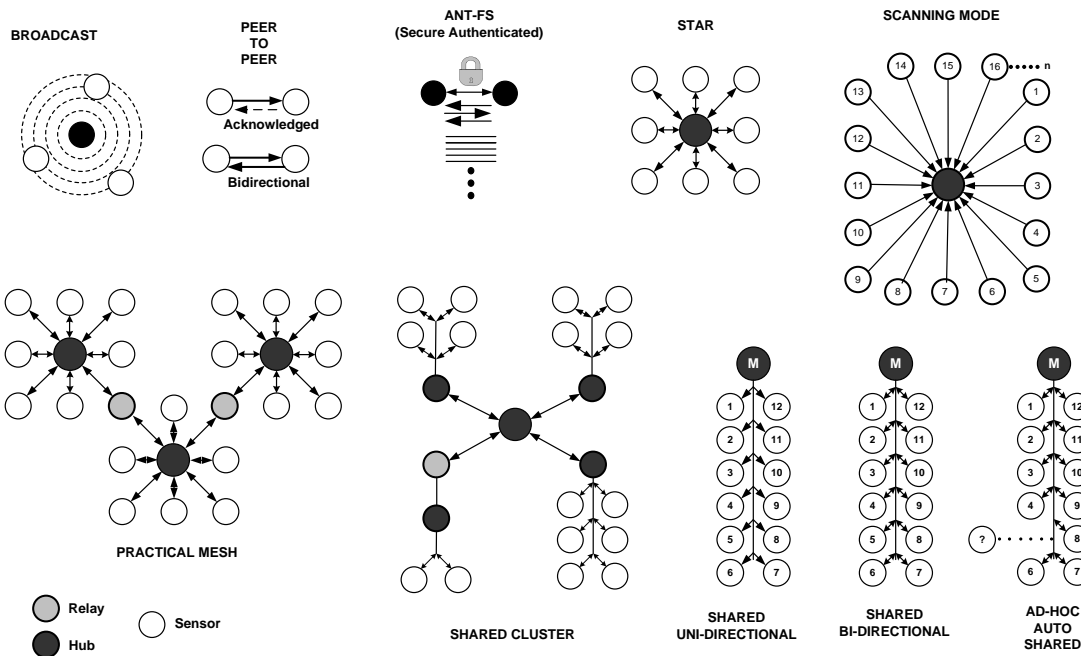
D00001513   Rev1.9

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Replaced products have 1 year warranty as stipulated in this term.

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IN NO EVENT SHALL GARMIN CANADA INC. BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT.

Garmin Canada Inc. retains the exclusive right to replace (with a new or newly-overhauled replacement product) the device or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE THE SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, the distributor or company shall contact Garmin Canada Inc. for shipping instructions and a return material authorization (RMA) tracking number. Securely pack the device and a copy of the original sales receipt, which is required as the proof of purchase for warranty repairs. Write the tracking number clearly on the outside of the package. Send the device, freight charges prepaid, to Garmin Canada Inc.

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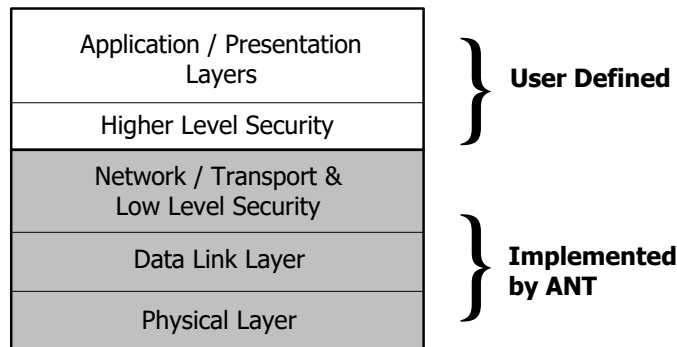
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ANT™ Overview

ANT™ is a practical wireless sensor network protocol running on 2.4 GHz ISM band. Designed for ultra low power, ease of use, efficiency and scalability, ANT easily handles peer-to-peer, star, tree and practical mesh topologies. ANT provides reliable data communications, flexible and adaptive network operation and cross-talk immunity. The protocol stack of ANT is extremely compact, requiring minimal microcontroller resources and considerably reducing system costs.

ANT provides carefree handling of the Physical, Network, and Transport OSI layers. In addition, it incorporates key low-level security features that form the foundation for user-defined, sophisticated, network-security implementations. ANT ensures adequate user control while considerably lightening computational burden in providing a simple yet effective wireless networking solution.

Application / Presentation Layers
Higher Level Security

} **User Defined**

Network / Transport & Low Level Security
Data Link Layer
Physical Layer

} **Implemented by ANT**

ANT supports public, managed and private network architectures with 2^{32} uniquely addressable devices possible, ensuring that each device can be uniquely identified from each other in the same network.

ANT is proven with an installed base of over four million nodes in ultra low power sensor network applications in sport, fitness, home and industrial automation. The ANT solutions are available in chips, chipsets and modules to suit a wide variety of application needs.

Enhancements in this new generation ANT core stack:

- Advanced burst data transfer up to 60 kbps (true data throughput)
- Single channel encryption
- Up to 8 ANT network keys
- High duty search and active search sharing
- Event buffer and filter
- Fast channel initiation
- Asynchronous transmission channel
- Selective data updates

The complete description and usage of ANT features is found in the document "ANT Message Protocol and Usage" available on www.thisisant.com.

ANT+ and ANT+ Alliance

ANT+ is the open application layer on the top of the ANT stack. It standardizes communications and facilitates interoperability between a wide array of personal sports, wellness and lifestyle monitoring devices. ANT+ defines device profiles that specify access, data formats, and channel parameters.

The ANT+ Alliance is comprised of companies who have adopted the ANT+ promise of interoperability. The Alliance ensures standardized communication through optimized brand value and partnerships with other top tier companies and products.

1. ANTUSB-m

The ANTUSB-m is a USB dongle that provides a quick and easy solution for Windows PC, Mac and Android equipment with an USB type A port to connect to ANT wireless networks. Applications running on these computers or equipment often perform as the hub node of a network through the ANT USB stick to receive, store, analyze and display data collected from ANT sensors or other wearable or portable hub devices, e.g. watches and bike computers. The application may also serve as the gateway to the Internet for cloud computing. The ANTUSB-m is a miniature design. When plugged in, the majority of the body is buried inside the computer or equipment.

The ANTUSB-m includes many new feature enhancements of ANT that deliver a better user experience on data download, private and secure data transfer, and connectivity with multiple devices. For a detailed description and usage of these ANT enhancements, please refer to "ANT Message Protocol and Usage" revision 5.0 or above.

The ANTUSB-m offering is supported by a set of Windows, MAC and Android drivers and a software library that provides application level interface to ANT functions. The accompanying software available from Garmin Canada Inc. includes sample application code that dramatically reduces the time required for connecting a computer to an ANT sensor network.

Operating in the globally available ISM radio frequency band of 2.4GHz, the ANTUSB-m stick conforms to multinational RF regulatory standards, allowing the same product line to be sold and used in North America, Europe, and Asia, without modification.

1.1 ANT Feature Enhancements

1.1.1 Advanced Burst

Advanced Burst is intended to facilitate and improve the ability of devices to reliably transfer information at a faster speed as high as 60kbps true data throughput. Advanced Burst will improve the efficiency of transferring a file over ANT-FS and provide a greater immunity to RF interference. It will also make the transfer less susceptible to failure when faced with a slow throughput from the host.

1.1.2 Single Channel Encryption

The new encrypted channel feature will allow data to be transmitted securely, enabling/simplifying applications that require data privacy, such as in the use cases of some medical devices. An ANT encrypted channel works in a connected state, where any number of slave channels may connect to an encrypted master channel after a successful negotiation. All transmitted packets will be protected using 128-bit AES-CTR symmetrical encryption.

1.1.3 High Duty Search

High duty search is a new search mode that replicates the duty cycle of a scanning channel for search purposes. This improves acquisition time in the general case. High duty search is targeted for higher power budget use cases such as USB sticks and cell phones. It aids in acquisition time and in improving search performance during multiple wireless protocol co-existence scenarios.

1.1.4 NVM User Space

ANTUSB-m has a 500-byte Non-Volatile Memory space that allows a host application to store and/or retrieve data on an ANT device. This feature could allow applications to retrieve specific data configured in an ANT Device during manufacturing. The maximum data block size is 36 bytes.

1.1.5 Event Buffer

Event Buffering is a feature designed to allow a host controller to configure a buffer to limit the frequency at which events are being sent from the ANTUSB-m to the Host. Event Buffering is intended for instances where the Host wishes to defer processing of ANT Events, generally in an effort to remain in a power down state for a longer period of time. Event Buffering can often be used with Event Filtering in these scenarios. The maximum event buffer size is 724 bytes.

1.1.6   Event Filter

Event Filtering is a feature designed to allow a Host controller to selectively prevent event messages from being sent from the ANTUSB-m to the Host. Event Filtering is intended for instances where the host wishes to eliminate processing of ANT Events, generally in an effort to remain in a power down state for a longer period of time or to avoid additional processing. Event Filtering can often be used with Event Buffering in these scenarios.

1.1.7   Fast Channel Initiation

A fast channel start can be selected when the channel is assigned. This will start a synchronous channel as soon as possible and will skip the search window check that is performed prior to starting a synchronous channel. An inherent risk in this operation is that it may negatively impact other devices in the area by starting a transmit channel at the same time. The lowest latency channel start time will occur when there are no other channels actively running/opened on the device.

1.1.8   Asynchronous Transmission Channel

An asynchronous channel can be selected when the channel is assigned. Pushing any data to an asynchronous channel will cause it to transmit this data as soon as possible one time. Asynchronous data will not block currently active synchronous channels unless the transmission is a burst. The lowest latency asynchronous channel transmission start time will occur when there are no other channels actively running/opened on the device. A scanning device will be needed to receive from an asynchronous transmitter.

1.1.9   Selective Data Updates

Selective Data Updating allows an application to request that the ANTUSB-m only generates received data serial messages if data in specified bytes has changed. This feature can be enabled for Broadcast messages only, or for Broadcast and Acknowledged messages. This would apply to applications which only need to update the display when the displayed data has actually changed and would like to be asleep otherwise. Up to 2 masks may be defined.

1.2   Drivers

Drivers are required for the ANTUSB-m

- Windows XP, Vista, 7 and 8 (Except for Windows RT)

  The Windows driver has been WHQL (Windows Hardware Quality Labs) certified and listed on windows updates. This allows the automatic driver installation, when the computer is connected to the internet, without special configuration or UAC (User Account Control) prompts.

  The driver is also available from www.thisisant.com.

- Mac OS X10 and above

  ANTUSB-m is designed to work with Apple's I/O Kit framework. No additional driver installation is required on Mac OS X machines.

- Android 3.1 and above

  The ANT USB Service and ANT Radio Service are freely available from play.google.com. The Android phone or tablet needs to support USB host feature, and for some, an USB socket converter or an USB OTG (On-The-Go) cable is required.

1.3   ANT library

ANT library packages are provided for development in several languages, including C++ for Windows and Mac, .Net library for Windows, and Java for Android. ANT library packages are accessible from www.thisisant.com upon the acceptance of the ANT+ adopter agreement. The usage of the Windows and Mac OS X library package is governed by ANT+ Shared Source License. The usage of the Android SDK package is governed by the Apache 2.0 license.

For detailed ANT feature description and message usage, please refer to "ANT Message Protocol and Usage"

1.4   VID, PID and Other Descriptors

The ANTUSB-m stick is loaded with default VID and PID values to allow working with the drivers and libraries. The default VID, PID and other default descriptor values are listed below.

Descriptors	Default Value
VID	0x0FCF
PID	0x1009
Manufacturer String	Dynastream Innovations
Device String	ANT USB-m Stick

1.5   Product Model and Brand

The ANTUSB-m stick is released in black color, unbranded and with a special ANT+ figure mark on the front. The top side is left blank for customers to print or apply a sticker of their own logos or brand names.

Product customization is offered for volume customers at a cost. The customization includes the choice of color, logo or brand printing on top or front and preload data up to 500 bytes in the user writer space. Please contact Garmin Canada Inc. directly for such request.

1.5.1   Top Logo Area

The top logo area of the ANTUSB-m is one of the options for printing. The surface is curved near the end of the stick, but any distortion of a flat image will be too small to make out under visual inspection

 The dimensions for a logo are:

> Width: 11mm

> Height: 7.1mm for a flat image projected onto the surface (7.3mm after projecting)
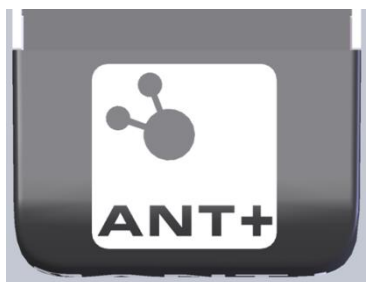
Figure 1 Top Logo Area using ANT+ Logo for Illustration

The curvature of the surface is larger near the end of the ANTUSB-m. So this is the area where any stretching of the image will occur.

The bottom corners do have a large fillet on them (approximately 1.9mm in radius). As such, any logos must take this into account if it is desired to have the logo off center.

1.5.2   Front Logo Area

The end logo area is the second location available for branding. It is a gently curved surface facing directly out when installed in a standard USB port.

Figure 2 Front Logo Area Using ANT+ Figure for Illustration

The dimensions for a logo are: 10.2mm x 3.5mm

The fillets on the edge can cause some distortion to the image as they "curl away" from the main printing location. This distortion will not be visible to the naked eyes. As well, objects that extend too far around the corner cannot be printed.

1.6   Ordering Information

The ANTUSB-m sticks are shipped in two packages from Garmin Canada Inc..

ANT Part Number	Package and Size
ANTUSB-m - Bulk	1000 ANTUSB-m sticks in one Carton. Carton dimension:292x238x155mm
ANTUSB-m - Tray	50 ANTUSB-m sticks on a plastic tray in ESD bag. Tray size: 281x227x10mm

1.7   Electronic Serial Number

A unique electronic serial number is programmed into each ANTUSB-m. This serial number can be used to track production history for the purpose of technical support and customer service.

To read out the serial number of an ANTUSB-m requires a Windows PC and taking the following steps:

1. Download and install the ANTwareII on the PC. ANTwareII is an ANT system testing and debugging tool, freely available on http://www.thisisant.com/developer/resources/downloads.

2. Plug in the ANTUSB-m to the PC and run the ANTwareII

3. Read the serial number as illustrated below
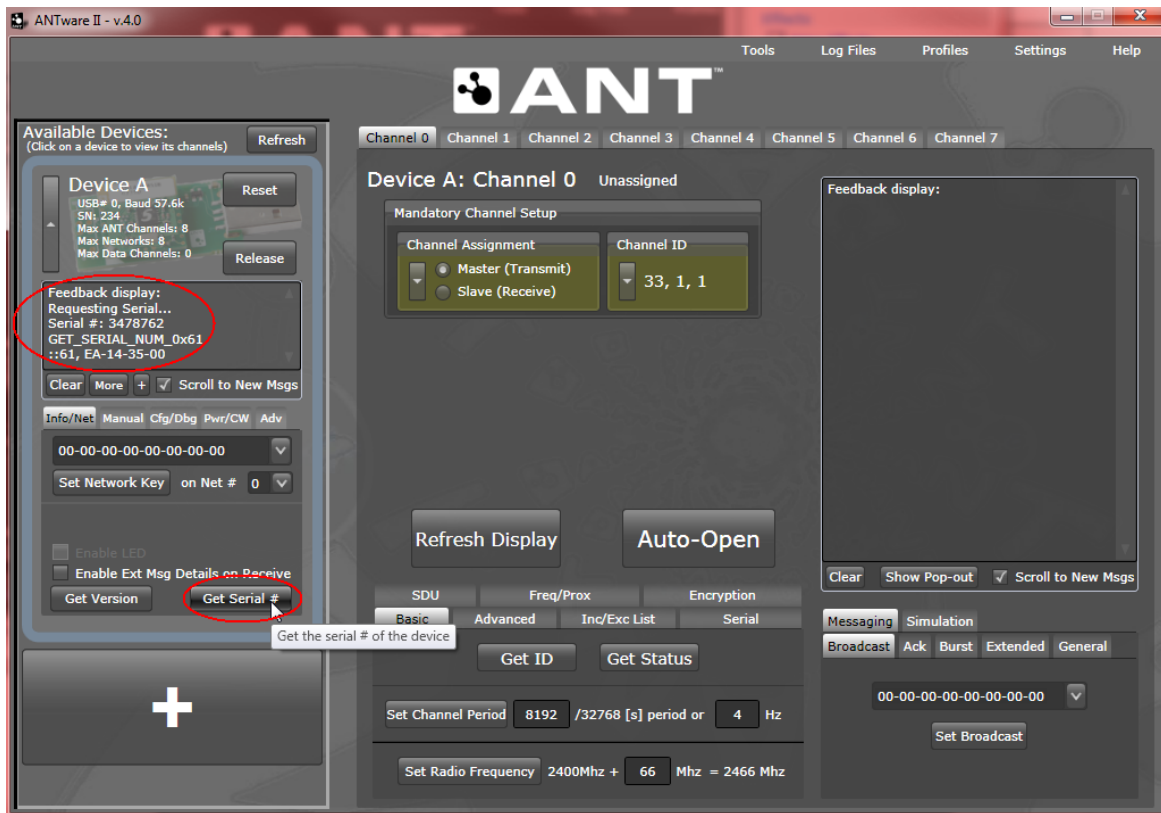
2. Regulatory Approval

The ANTUSB-m has received regulatory approvals in the United States, Canada, European Economic Area, Great Britain, China, Japan, Australia, New Zealand, Korea and Taiwan. Please contact Garmin Canada Inc. to access the test certificates and/or the reports.

2.1   United States

The ANTUSB-m has been tested and found to comply with Part 15 of the FCC interference limits for Class B and class C devices. Operation is subject to the following two (2) conditions: 1) This device may not cause harmful interference and 2) This device must accept any interference received including interference that may cause undesired operation.

This equipment generates, uses and can radiate radio frequency energy and may cause harmful interference to radio communications if not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

•   Reorient or relocate the receiving antenna.

•   Increase the separation between the equipment and the receiver.

•   Connect the equipment into an outlet that is on a different circuit from the receiver.

•   Consult the dealer or an experienced radio/TV technician for help.

This product does not contain any user-serviceable parts. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate this device under Part 15 regulations.

The ANTUSB-m dongle is marked with "FCC ID: O6R2021" (note: First Character is the letter O, not the # 0.)

2.2   Canada

The ANTUSB-m complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

(Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.)

The ANTUSB-M dongle is marked with "IC: 3797A-2021"

2.3   European Economic Area and Great Britain

The ANTUSB-m is declared to be in conformance with the essential requirements and other relevant provisions of Directive 2014/53/EU and 2011/65/EU, as a low-powered unlicensed transmitter:

EN 6950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013	Information technology equipment. Safety. General requirements
EN 300 440 v2.1.1 2017-03	Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40GHz frequency range
EN 301 489-3 v2.1.1 2017-03	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 KHz and 246 GHz
EN 61000-6-3	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments
EN 62479:2010	Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)
EN 55032:2012 (CISPR 32)	Electromagnetic compatibility of multimedia equipment – Emission requirements
EN 301 489-1 V2.1.1 2017-02	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

2.4   Australia and New Zealand

The ANTUSB-m has been tested and found to comply with AS/NZS 4268:2003, Radio equipment and systems – Short range devices. ACMA supplier code number: N20233.

2.5   China

The ANTUSB-m has been granted radio transmission equipment type approval certificate with CMIIT ID: 2012DJ8078 in accordance with the provisions on the Radio Regulations of the People's Republic of China. Validity period: 5 years from Dec 24, 2012.

2.6   Japan

The ANTUSB-m has been granted type certificate (mark number R203-JN6016). Standard applied: Notification No. 88 of MIC 2004, 2.4GHz band wide-band low-power data communication system (item 19 of Article 2 paragraph 1)

2.7   Korea

The ANTUSB-m has been certificated under the Clause 2, Article 58-2 of Radio Wave Act by Korea Communications Commission, Republic of Korea. The certification No. is MSIP-CRM-D23-ANTUSB-m

2.8   Taiwan

The ANTUSB-m has been tested and granted low power radio type approval in Taiwan. Certificate label:

CCAK12LP0500T2
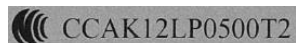
3. Specifications

3.1   Mechanical

Item	Specification	Notes
Full Product Size	L 19.0 ± 0.3mm x W 12.4 ± 0.3mm x H 5.3 ± 0.3mm	
Product weight	<5g	
USB Connector	Type A	
Contact Durability	Rated for 400 insertions into USB port	
Housing	PC/ABS plastic and stainless steel	
Color	Black	

3.2   Environmental

Item	Specification	Comments
Storage temperature	-40°C to +70°C	
Operational temperature	-10°C to +50°C	
Drop resistant	Survives with full functionality after 1m on all 6 sides onto concrete surface	Cosmetic damage may occur.
Impact resistant	Survives impacts associated with typical PC Dongle – rough usage	

3.3   Electrical

Element	Specification	Comments
Operating Voltage	4.40V to 5.25V	
Active Current	8.5mA to 13mA	
Suspend Current	0.5mA	

3.4   RF Communications

Element	Specification	Comments
RF Frequency Band	2403 – 2480 MHz	
Peak TX Power	Maximum output power 4dBm	Typical 0dBm
Average EIRP	-3dBm +/-4dBm	
Antenna Gain	0 – 2 dBi	
Antenna Directivity	3dBi typical	
Band Edge Power	-40dBm maximum (AU/NZ specification)	
Harmonics Power	-40dBm maximum (AU/NZ specification)	
Communication Range	Typical 5-10m	Depending on specific environment and receivers.

4. Mechanical Drawing

5. Support

Users can seek application support from Garmin Canada Inc., www.thisisant.com.

5.1   ANT Forum

Users are encouraged to participate in the ANT forum moderated by the application engineering team of Garmin Canada for any engineering discussions. Joining the ANT forum is free and open at http://www.thisisant.com/forum.

5.2   Public Technical References

Documents:

1.   ANT Message Protocol and Usage

Software:

2.   Driver Windows XP, Vista, 7 and above

3.   ANT library package for windows

4.   ANT library package for Mac OS X

5.   Android ANT SDK package

6.   ANTwareII – a system testing and debugging tool

The above documents and software are available at http://www.thisisant.com/developer/resources/downloads.

5.3   ANT Developer's Zone

ANT development software tools, application notes, reference designs and other public resources are found in the ANT developer's zone at http://www.thisisant.com/developer.

To begin development with the ANT+ interoperability, please become an ANT+ Adopter or ANT+ Alliance member to obtain the access to the ANT+ Adopter Zone. ANT+ documents and design tools contained in the ANT+ Adopter zone include the ANT+ Device Profiles, ANT-FS specification, ANT software (PC/Mac) libraries with source code, and embedded reference designs with source code.

5.4   ANT Social Networks

ANT is on the following social networks,

YouTube: http://www.youtube.com/user/ANTAlliance

Twitter: http://twitter.com/ANTPlus

Facebook: https://www.facebook.com/thisisant

LinkedIn: http://www.linkedin.com/groups?gid=1379137